REMARKS

Claims 1 and 3-35 are pending in the application and stand rejected. In the present response, claims 1 and 3-35 have been amended, claims 23-25, 30 and 32-33 have been canceled, and new claims 36-37 have been added. Reconsideration and reexamination of the pending claims is respectfully requested in view of the present amendments and remarks.

In the Specification

Paragraphs [0128]-[0134] of the specification (paragraphs [0150]-[0156] of the published application) have been amended to correct minor informalities. No new matter has been added.

In the Claims

A. The Rejection under 35 USC 101

Claims 1, 3-35 have been rejected under 35 USC 101. The Office Action has cited case law, including *In re Bilski*, 88 USPQ 1385 (Fed. Cir. 2007), and a page 4 has summarized criteria for patentability as follows:

"1) specify transforming (physical thing) or

2) have the FINAL RESULT (not the steps) achieve or produce a

useful (specific, substantial, AND credible),

concrete (substantially repeatable/non-unpredictable, AND

tangible (real world/non-abstract) result."

1. Principles of Law

Bilski has defined a test for patentability of a process under 35 USC 101 as follows:

> A claimed process is surely patent-eligible under § 101 if: (1) it is tied to a particular machine or apparatus, or (2) it transforms a particular article into a different state or thing. *Bilski* at 1391.

The Federal Circuit has stated that the new "machine-or-transformation" test replaces previous tests, such as the *Freeman-Walter-Abele, Alappat, State Street* and "technological arts" *Bilski* at 1394-1395; *In re Ferguson* (2007-1232, decided March 6, 2009) ("Specifically, we

rejected the viability of the 'useful, concrete and tangible result' language of State Street & Trust Co. v. Signature Financial Group, 149 F3d 1373 (1998) as a test, because … it inappropriately focuses on the result of the claimed invention rather than the invention itself". *Id* at 6-9).

Based on the holdings of *Bilski* and *Ferguson*, it is respectfully submitted that the threshold for patentability outlined in the Office Action appears to be more restrictive than the test enunciated by the Court of Appeals for the Federal Circuit.

Bilski stated that the new test should not be considered an a priori exclusion of software claims ("although invited to do so by several amici, we decline to adopt a broad exclusion over software or any such category of subject matter") or of claims that lack significant "physical steps" ("Some may suggest that *Comiskey* implicitly added a new § 101 test that bars any claim reciting a mental process that lacks significant 'physical steps.' We did not so hold … Conversely, a claim that lacks any 'physical steps' but is still tied to a machine or achieves an eligible transformation passes muster under § 101") *Id.* at 1395-1396.

In one example, the court stated that processes based on data processing that produce a physical image are patentable ("We further note for clarity that the electronic transformation of the data itself [by a computed tomography scanner] into a visual depiction in *Abele* was sufficient; the claim was not required to involve any transformation of the underlying physical object that the data represented") *Id.* at 1397.

The Board of Patent Appeals and Interferences (BPAI) has interpreted *Bilski* in a number of appeal holdings, providing guidance relative to the application of *Bilski* within the Office.

In a group of cases, the BPAI has held that claims directed to software code or to processes that do not positively recite a machine, that are not tied to a particular machine or apparatus, that are not tangibly embodied in a computer readable medium, or that do not transform an article to a different state or thing are not directed to statutory subject matter. *Ex parte Russell* (2008-0130), *Ex parte Uceda-Sosa* (2008-1632), *Ex parte Noguchi* (2008-1231), *Ex parte Halligan* (2008-1588), *Ex parte Koo* (2008-1344), *Ex parte Becker* (2008-2064), *Ex parte Atkin* (2008-4352), *Ex parte Berkun* (2008-3005), *Ex parte Enenkel* (2008-2239), and *Ex parte Bodin* (2008-4315); *Ex parte Barnes* (2007-4114).

Means-plus-function claims, such claims reciting "logic means," "means for rasterizing" or "monitoring device" were not considered patentable when those claims might have been interpreted as embodied in software alone consistently with the specification. *Ex parte Robert Mark Magid* (2008-3824); *Ex parte Morris* (2008-5581); *Ex parte Motoyama* (2008-2753)

The BPAI also has held that the scope of § 101 is the same regardless of the form - machine or process - in which a particular claim is drafted, particularly when the specification provides no definition of a machine. *Ex parte Cornea-Hasegan* (2008-4742); *Ex parte Mitchell* (2008-2012); *Ex parte Arning* (2008-3008); *Ex parte Halligan* (2008-2823).

The BPAI has further held that generalized recitations such as "a computerized method performed by a data processor" or "displaying the calculated result to a target user" failed to put any meaningful limits on a claim's scope because they did not represent physical and tangible objects or provided only a statement of intended use. *Ex parte Gutta* (2008-3000); *Ex parte Taiga Nakamura* (2008-0773); *Ex parte Giacchetti* (2008-2866); *Ex parte Daughtrey* (2008-0202). In *Ex parte Borenstein* (2008-3475), the BPAI held that "the storing of catalog information for future use" provided no utility that benefitted the public, but that providing "path information" between multiple stores implied inherently that this information must be stored on a computer or database, which was held sufficient to meet the machine prong of *Bil*ski. *Id.* at 10.

However, the BPAI has held that a Beauregard claim is directed to statutory subject matter. *Ex parte Bo Li* (2008-1213) ("It has been the practice for a number of years that a "'Beauregard Claim' of this nature be considered statutory at the USPTO as a product claim ... the instant claim presents a number of software components, such as the claimed logic processing module, configuration file processing module, data organization module, and data display organization module, that are embodied upon a computer readable medium. This combination has been found statutory" *Id.* at 8-9).

The BPAI also has clarified that "'a computer medium including a program,' or restated, computer software recorded on a storage media ... fall within the meaning of 'manufacture' as defined in *Diamond v. Chakrabarty*, 447 U.S. 303, 308 (1980)." *Ex parte Mazzara* (2008-4741) at 22. The BPAI then considered "whether a claim that recites 'a computer usable medium' should be interpreted so broadly as reading not only on statutory subject matter, but additionally reading on non-statutory subject matter as well. The Federal Circuit has not considered this precise issue, but the USPTO has, for a number of years, considered such claims to be statutory as product claims." (Citations omitted, emphasis in original). *Id*. at 20. The BPAI has further clarified that: "[t]he Examiner has not cited any legal authority for the proposition that a claim to a computer usable media should be barred under 35 U.S.C. § 101 merely because it may incidentally read on nonstatutory subject matter. In fact, if this were the law, all claims to computer readable media would be presumed nonstatutory unless the associated Specification clearly and unambiguously defined the term "computer readable medium" to be limited to only

statutory subject matter. Such a bright-line default rule would be contrary to established precedent." (Citation omitted).

In *Ex parte Le Buhan* (2008-3441), the BPAI held that "a received/decoder unit having a local storage unit is mentioned in the preamble, which storage unit is embodied in the first step of storing the encrypted content. We also note in the preamble a security unit, which is embodied in the second step of storing the system keys. Both the local storage unit and the security unit constitute tangible, solid, real-world machines, the former exemplified by a magnetic hard disk, and the latter by a smart card … We find these elements sufficient for satisfying the 'particular machine' prong of the *Bilski* machine or transformation test, and thus find the Examiner erred in rejecting these method claims 1 to 11 for being non-statutory." *Id.* at 12.

2. Analysis

The claims in the application, as presently amended, all relate to "a computer medium," therefore, are structured as Beauregard claims, which have been considered patentable by the BPAI consistently with *Bilski*, meeting the threshold requirements of *Ex parte Bo Li*, discussed above.

Further, the claims in the claims in the application recite tangible, solid, real-world machine components, for example, "one or more sensors," "a computer," "a central processing unit," or "one or more memories," meeting the threshold requirements of *Ex parte Le Buhan*, discussed above.

These machines components are discussed in the specification as embodied in physical objects and not as software add-on, meeting the threshold requirements of *Ex parte Mazzara*.

For at least these reasons, it is respectfully submitted that the pending claims are directed to patentable subject matter consistently with the holdings of *Bilski* and of subsequent applications of *Bilski*. Accordingly, the withdrawal of the rejection under 35 USC 101 is respectfully requested.

B. The Rejections under 35 U.S.C. 112, Second Paragraph

Claims 1, 33 and 35 have been rejected under 35 U.S.C. 112, second paragraph because of the term "pseudorandom." In the Response to Arguments at pages 74-75, the Office Action has acknowledged that evidence submitted that Applicant proves that "pseudorandom" is a recognizable term within the art, but has restated the rejection on the

grounds that “pseudorandom” is a relative term, and that no explanation has been provided of how “random” or “methodical” the “pseudorandom distribution” is. This ground for rejection is traversed at least for the following reasons.

MPEP 2173.05(b) “Relative Terminology” explains that “[a]cceptability of the claim language depends on whether one of ordinary skill in the art would understand what is claimed, in light of the specification.”

In previous correspondence, Applicant has already provided evidence that “pseudorandom” is a term defined in mathematical dictionaries (and, it is added, even in general purpose dictionaries such as Marriam-Webster and The American Heritage Dictionary), and that “pseudorandom” has been employed in scientific or technical articles without further explanation. This evidence proves that a person skilled in the art would readily recognize the meaning and import of that term, meeting the requirements of MPEP 2173.05(b). Therefore, no further definition of “pseudorandom” appears to be necessary.

Applicant further submit that this ground of rejection imposes a burden on Applicant that is unreasonable in view of the burdens imposed on similarly placed applicants and of the practices of the Office. The records of the Office indicate that 1199 issued patents contain “pseudorandom” in one or more claims. An analysis of the three most recently issued patents among those 1199 patents (patent nos. 7,509,569 at claims 6 and 13; 7,508,393 at claim 6; 7,508,274 at claim 11) indicate that “pseudorandom” was used in the specification and recited in the claims without any explanations of the kind requested in the Office Action.

Moreover, the use of terms of arguably relative meaning is accepted by the Office not only in the art of artificial intelligence but in other arts as well. By way of example, in the mechanical arts, terms as members “protruding outwardly” or “projecting outwardly” are commonly used but no burdens appear to have been placed on Applicants to define the relative degree of “outwardly.” See, for example, patent nos. 7,509,033 at claims 6 (“projecting outwardly”) and 7,507,917 (“protruding outwardly”). Likewise, expressions such as “a silicon dioxide source that is essentially free of alkali metals” have been found patentable, without requiring a definition of the relative degree of “free of alkali metals.” *In re Marosi,* 218 USPQ 289 (CCPA 1983).

Based on the foregoing, the withdrawal of the rejections under 35 USC 112, second paragraph is respectfully requested.

C. The Rejections under 35 USC 103(a)

Claims 1, 3-9, 11-13, 23-25 and 30-35 stand rejected under 35 U.S.C. 103(a) over Buscema, SCIENTIFIC BACKGROUND OF DYNAMIC ADAPTIVE SYSTEMS ("Buscema") in view of Feldgajer, US 5,832,466 ("Feldgajer").

Claims 10, 14 and 21-22 stand rejected under 35 U.S.C. 103(a) over Buscema in view of Feldgajer and further in view of Lapointe, US 2003/0004906.

Claims 15-17 stand rejected under 35 U.S.C. 103(a) over Buscema in view of Feldgajer and further in view of Boden, US 5,708,774.

Claims 18-20 stand rejected under 35 U.S.C. 103(a) over Buscema in view of Feldgajer and further in view of Boden and of Burke, A GENETIC ALGORITHM TUTORIAL TOOL FOR NUMERICAL FUNCTION OPTIMISATION.

Claims 26 and 28 stand rejected under 35 U.S.C. 103(a) over Buscema in view of Feldgajer and further in view of Rose, US 2002/0178132.

Claim 27 stand rejected under 35 U.S.C. 103(a) over Buscema in view of Feldgajer and further in view of Breed, US 2003/0002690.

Claim 29 stand rejected under 35 U.S.C. 103(a) over Buscema in view of Feldgajer and further in view of Boden and Lapointe.

The rejections under 35 U.S.C. 103(a) are respectfully traversed at least for the following reasons.

1. Buscema

With regard to claim 1, the Office Action at page 6 has characterized Buscema as teaching the definition of one or more distributions of the database records into respective training and testing subsets. It is respectfully submitted that Buscema teaches distributing the database records into a single training and a single testing subset and not a plurality of training and testing sets. See, e.g., Buscema at page 2, col.2, lines 35-37 ("Each ANN was required to classify the new cases in the testing (442) on the basis of the previous acquired experience with the training sample") and at page 4, col. 2, lines 40-41 ("The initial database was randomly divided into two samples: a training set and a testing set"). Therefore, Buscema does not teach defining a plurality of distributions of the database records onto more than one training and testing subsets, nor training and testing a first generation set of prediction algorithms using a plurality of distributions of the database records, each of said prediction algorithms being

associated with a certain distribution of said database records, as in Applicant's claim 1.

The Office Action at page 9 also has characterized Buscema as teaching using the distribution of the database records associated with the selected prediction algorithm in performing supervised learning. It is respectfully submitted that claim 1 defines "distribution" differently from Buscema, namely, as a distribution within a plurality of distributions that provides a prediction algorithm with a best fitness score, and not as the single distribution created by the single random selection that is taught in Buscema.

2. Feldgajer

The Office Action has characterized Feldgajer as filling the deficiencies of Buscema. Applicant respectfully disagrees.

Feldgajer discloses a system and method for dynamic learning control in a neural network. The method begins by providing a population of neural networks and then iteratively modifies one or more parameters in each successive generation based on the network with the best training response in the previous generation. See, Feldgajer at the Abstract.

In particular, Feldgajer teaches modifying a "parameter value" of an artificial neural network (ANN) and explains that each ANN has a unique parameter value, the relations among different ANNs being defined by the closeness of the respective parameter values. See, Feldgajer at col. 4, lines 46-51. Therefore, a "parameter value" is an intrinsic characteristic of each ANN that is related to the structure the ANN and that is not external to the ANN such as, for example, a data set that may be input to the ANN.

The method taught by Feldgajer is based in altering one or more parameter values of an ANN by intervening on the ANN itself, rather than by modifying the training and testing datasets of a predictive algorithm such as an ANN as taught by Applicant.

By way of example, Feldgajer teaches that

> [a]n individual that is considered to be the most successful is used to provide an artificial neural network topology for all individuals in a subsequent generation within the individual's group" (col. 6, lines 62-65)

or, alternatively, that

> [e]ach group within a generation is assigned a range of values for a particular parameter, in the form of learning rate. … An individual that is considered to be the most successful is used to provide an artificial neural network topology for all individuals in a subsequent generation within the individual's group. Alternatively, the most successful individual is used to provide an artificial neural network topology for all individuals in a subsequent

generation. (col. 7, line 3-20).

By way of another example, Feldgajer teaches at col.7, line 50 – col. 8, line 57 and with reference to FIG. 4, that:

a. a population of ANNs having a known architecture is created and that each individual is provided with a unique parameter value;

b. the individual ANNs are evaluated to determine training parameters and learning ability, and that each individual is trained using the same values or with different values but without statistically favoring any individual; and

c. at least the individual with the most desirable learning ability is selected, or, alternatively, that the parameters of some of the individuals within the population are varied either with a genetic algorithm or in dependence upon the parameter value of the best network within the generation.

Feldgajer describes four embodiments (col. 4, line 43-col. 5, line 51), each proving that Feldgajer's invention is based on altering one or more parameter values of an ANN by intervening on the ANN rather than by modifying the training and testing datasets of the ANN:

a. A method of designing an ANN, in which an output response to training is dependent upon at least a parameter value. This method involves forming a plurality of groups of individual artificial neural networks, each individual in each group having a unique parameter value. A computer is used to apply to each individual a plurality of input stimuli and their corresponding expected output responses. The output responses are then compared to a corresponding expected output response to determine the parameter value that is a "best fit." New parameter values are assigned to the plurality of groups of individuals based on the parameter value that is the "best fit" and define a second range of values. This process is repeated until an individual in a group is within a predetermined tolerance of the expected output response.

b. A method of designing an ANN, in which a parameter value is determinative of training response. A first range of parameter values is assigned to a first group of individuals that correspond to particular output responses. Another range of parameter values is assigned to another group of individuals, each individual in the other group being assigned a single unique parameter value, and so on. A computer samples the assigned individuals' output responses to input stimuli and those parameter values that produced output responses within predetermined acceptable limits are selected and new ranges of parameter values are assigned to the groups in dependence upon those values selected. The process is repeated until a

parameter value is found that yields an output response that is acceptably close.

c. A computer system having a population of back-propagation neural networks, in which there is an iterative process of finding at least a parameter that results in acceptable training. The process involves iteration of the steps of grouping the individual neural networks into a plurality of groups forming the population; assigning to each group parameter values wherein each group of the plurality of groups has a parameter value that is the same as a parameter in another group; testing each neural network's output response for a particular input string of values, determining choice parameter values; and assigning new parameter values to the population of neural networks based on the choice parameter value.

d. An embodiment, in which the second range of values is a contracted range of values, the difference between adjacent values in the second range of values being less than the difference between adjacent values in the range of values.

3. Analysis

Contrary to Feldgajer, Applicant teaches at paragraphs 83-90 of the specification (paragraphs 86-93 of the published application) and at FIG. 2, that:

the database is randomly divided into a testing and a training set, and that such step is repeated x times;

a population of x prediction algorithms (for brevity, ANNs) is created, each of the ANNs being generated through one of the x divisions of the database;

the testing and training sets may be inverted to created x more ANNs;

an evolutionary algorithm can evaluate the fitness of the ANNs;

the evolutionary algorithms can provide for the generation of “child” prediction algorithms by merging or mutating the distribution of records of the parent algorithm, and the process may be repeated until optimum fitness is reached;

one or more ANNs with the best fitness score can be selected, and the corresponding distribution of records on training and testing subsets may be used to train and test ANNs for the problem under investigation.

Therefore, neither Buscema nor Feldgajer, alone or in combination, teach or suggest, among other things, the following limitations of claim 1:

training and testing a first generation set of prediction algorithms using the plurality of

distribution of the database records, each of said prediction algorithms being associated with a first different distribution of said database records;

generating a population of prediction algorithms, wherein each one of said prediction algorithms is trained and tested according to a second different distribution of the records of the data set in the complete database onto a training data set and a testing data set,

each second different distribution being created as one of a random or pseudorandom distribution,

each prediction algorithm of said population being trained according to its own distribution of records of the training set and being validated in a blind way according its own distribution on the testing set, and

a score reached by each prediction algorithm being calculated in the testing phase representing its fitness;

providing an evolutionary algorithm which combines the different models of distribution of the records of the complete data set in a training and in a testing set, which sets are represented each one by a corresponding prediction algorithm trained and tested on the basis of said training and testing data set according to the fitness score calculated in the previous step for the corresponding prediction algorithm,

the fitness score of each prediction algorithm corresponding to one of the different distributions of the complete data set on the training and the testing data sets being the probability of evolution of each prediction algorithm or of each said distribution of the complete data set on the training and testing data sets.

For at least these reasons, the rejection of claims 1-24 under 35 USC 103(a) is respectfully traversed.

Claims 3-9, 11-13, 31 and 34-35 are believed patentable over Buscema and Feldgajer for the same reasons as claim 1 and for the additional limitations contained therein.

Claims 10, 14, and 21-22; 15-17; 18-20; and 26-29 are believed patentable over Lapointe, Boden, Burke, Rose and Breed because those references fail to fill the deficiencies of Buscema and Feldgajer.

Therefore, the withdrawal of all rejections under 35 U.S.C. 103(a) is respectfully requested.

D. The New Claims

New claims 36-38 are supported in the specification. In particular, support for new claims 36-37 can be found at paragraphs 135-169 of the specification (paragraphs 157-217 of the published application) and support for claim 38 can be found, for example, at FIG. 4.

Conclusion

It is believed that all objections and rejections in the application have been addressed and that the application is now in condition for allowance. A notice to that effect is respectfully requested.

A one-month extension fee is enclosed herein.

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